PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-040482
(43)Date of publication of application : 06.02.2002

(51)Int.CI. G02F 1/1368
G02B 5/20
G02F 1/13
G02F 1/133
G02F 1/1335
G02F 1/1343
G09F 9/30
G09G 3/20
G09G 3/36
H04N 5/66
H04N 5/74

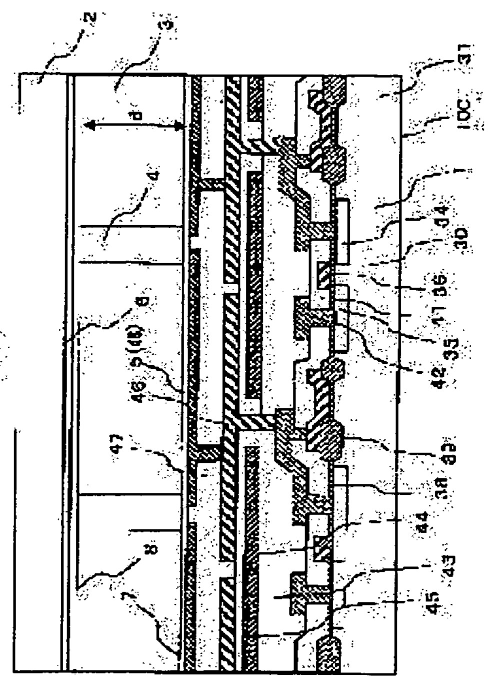
(21)Application number : 2000-226182
(22)Date of filing : 21.07.2000

(71)Applicant : HITACHI LTD
HITACHI DEVICE ENG CO LTD
(72)Inventor : MATSUMOTO KATSUMI
TAKEMOTO KAYAO
NAKAGAWA HIDEKI
ITO EIICHIRO
IGUCHI TSUDOI
KITAJIMA KENJI
KOHATA MASATOSHI
OHASHI KENJI
NAKAMURA SHIGEO
SAKAI KOKI

(54) LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To actualize a reflection type liquid crystal display device which has high luminance and high picture quality.
SOLUTION: The reflection type liquid crystal display device is composed of a driving circuit board where a reflection electrode is formed, a transparent substrate, and a liquid crystal composition sandwiched between the driving circuit board and transparent substrate and is provided with a 1st light shield film which covers and shields a semiconductor element on the driving circuit board so that no light is made incident on the semiconductor element and a 2nd light shielding film which covers the gap between reflection electrodes.

図1



LEGAL STATUS

[Date of request for examination] 27.01.2004
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's

decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] It is the liquid crystal display which has the light-shielding film prepared in the bottom of the liquid crystal constituent inserted into a substrate, the 2nd substrate, and the 1st 1st substrate of the above and 2nd substrate, two or more reflectors prepared in the 1st substrate of the above, and the above-mentioned reflector of the 1st substrate of the above, and is characterized by forming this light-shielding film so that the clearance between the above-mentioned reflector and a reflector may be covered.
[Claim 2] The liquid crystal display characterized by having the 2nd light-shielding film of a wrap for the clearance between the liquid crystal constituent inserted between the drive circuit board, the transparence substrate, and the above-mentioned drive circuit board and a transparence substrate, two or more reflectors prepared in the above-mentioned drive circuit board, the semiconductor device which supplies a signal to this reflector, the 1st light-shielding film which covers this semiconductor device and shades, and the above-mentioned reflector and a reflector.
[Claim 3] The resin spacer holding spacing of the 1st substrate, the 2nd substrate, and the 1st substrate and the 2nd substrate, The circumference frame and the 1st substrate of the above which were formed by the same resin as this resin spacer, The liquid crystal constituent enclosed with the interior surrounded by the 2nd substrate of the above, and the above-mentioned circumference frame, Two or more reflectors prepared in the 1st substrate of the above, and the dummy electrode formed between this reflector and the above-mentioned circumference frame, It is the liquid crystal display which has the 2nd light-shielding film of a wrap for the clearance between the semiconductor device which supplies a signal to the above-mentioned reflector, the 1st light-shielding film which covers this semiconductor device and shades, and the above-mentioned reflector and a reflector, and is characterized by supplying a signal, as for the above-mentioned dummy electrode.
[Claim 4] The signal supplied to the above-mentioned dummy electrode is a liquid crystal display according to claim 3 characterized by being the signal which performs a black display.
[Claim 5] The signal supplied to the above-mentioned dummy electrode is a liquid crystal display according to claim 3 characterized by being the signal which a polarity reverses to the same timing as a dummy electrode and a ****** reflector.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention irradiates the illumination light from the light source at a liquid crystal display component, and relates to the liquid crystal display for liquid crystal projectors which projects the image of a liquid crystal display component on a screen.
[0002]
[Description of the Prior Art] In recent years, the liquid crystal display has spread through display terminals, such as the so-called OA equipment, widely from the small display. Fundamentally, between the insulating substrates of a pair which consist of a glass plate, a plastic plate, etc. at least with transparent one side, this liquid crystal display pinches the layer (liquid crystal layer) of a liquid crystal constituent, and constitutes the so-called liquid crystal panel (it is also called a liquid crystal display component or a liquid crystal cell). The format of changing the direction of orientation of the liquid crystal molecule which impresses an electrical potential difference to the various electrodes for pixel formation formed in the insulating substrate of this liquid crystal panel alternatively, and constitutes the liquid crystal constituent of a predetermined pixel part, and performing pixel formation (passive matrix), By forming the active component the various above-mentioned electrodes and for pixel selection, and choosing this active component It is roughly classified into the format (active matrix) of changing the direction of orientation of the liquid crystal molecule of the pixel between the pixel electrode linked to the active component concerned, and a reference electrode, and performing pixel formation.
[0003] Generally, the so-called vertical electric-field method which impresses the electric field for changing the direction of orientation of a liquid crystal layer between the electrode formed in one substrate and the electrode formed in the substrate of another side is used for an active matrix liquid crystal display. Moreover, the so-called liquid crystal display of the horizontal electric-field method (it is also called an IPS method) which makes the direction of the electric field impressed to a liquid crystal layer a direction almost parallel to a substrate side is put in practical use.
[0004] On the other hand, the liquid crystal projector is put in practical use as an indicating equipment using a liquid crystal display. A liquid crystal projector irradiates the illumination light from the light source at a liquid crystal display component, and projects the image of a liquid crystal display component on a screen. the case where a liquid crystal display component is used as a reflective mold although there were a reflective mold and a transparency mold in the liquid crystal display component used for a liquid crystal projector -- a pixel -- the whole region can be mostly made into an effective reflector, and it is advantageous as compared with a transparency mold in a raise in the miniaturization of a liquid crystal display component, highly-minute-izing, and brightness.
[0005] Therefore, a high definition liquid crystal projector can be realized small by using the liquid crystal display component of a reflective mold, without reducing brightness.
[0006]
[Problem(s) to be Solved by the Invention] There is a technical problem called a raise in a miniaturization, highly-minute-izing, and brightness in a liquid crystal projector. In order to solve this technical problem, it is necessary to realize further miniaturization [of the liquid crystal display component used for a liquid crystal projector], highly-minute-izing, and high brightness-ization. A miniaturization and when making it highly minute, the big fall of comparatively (a numerical aperture is called below) of the passage area of the light per pixel cannot avoid a transparency mold liquid crystal display component easily.
[0007] The purpose of this invention is to offer the reflective mold liquid crystal display in which a raise in brightness is possible. Moreover, it is in offering a high-definition reflective mold liquid crystal display. Moreover, it is in high-definition image quality and offering the liquid crystal projector using the liquid crystal display and it with high efficiency for light utilization by the high numerical aperture by preventing the incidence of an unnecessary light generated for a liquid crystal display component.
[0008]
[Means for Solving the Problem] For a wrap reason, the clearance between the 1st light-shielding film which covers a semiconductor device and shades, and the above-mentioned reflector and a reflector is established for the 2nd light-shielding film in the bottom of a reflector so that light may not carry out incidence to the semiconductor device prepared in the drive circuit board with the liquid crystal display which has the liquid crystal constituent inserted into the drive circuit board in which the reflector was prepared, the transparence substrate which countered the drive circuit board and was formed, and the drive circuit board and a transparence substrate.
[0009]
[Embodiment of the Invention] Hereafter, with reference to an example, it explains to a detail about the gestalt of operation of this invention.
[0010] Drawing 1 is a mimetic diagram explaining one example of the liquid crystal display by this invention. In drawing 1 , the spacer 4 a liquid crystal constituent and whose 4 are spacers as for the drive circuit board whose 100 is a liquid crystal display component, and whose 1 is the 1st substrate, the transparence substrate whose 2 is the 2nd substrate, and 3 forms the cel gap (cell gap) d which is fixed spacing between the drive circuit board 1 and the transparence substrate 2. The liquid crystal constituent 3 is pinched by this cel gap d. 5 is formed in the drive circuit board 1 with the reflector. 6 impresses an electrical potential difference to the liquid crystal constituent 3 between reflectors 5 with a counterelectrode. 7 and 8 make the orientation of the liquid crystal molecule carry out in the fixed direction by the orientation film. 30 supplies an electrical potential difference to a reflector 5 with an active component.
[0011] As for the 1st interlayer film and 42, the field oxide from which a gate electrode and 38 separate an insulator layer and, as for a source field and 35, 39 separates between transistors for 34 electrically, as for a drain field and 36, and 41 are [the 1st electric conduction film and 43] the 2nd interlayer film and 2nd electric conduction film with which in the 1st light-shielding film and 45 the 2nd light-shielding film and 47 form the 4th interlayer film, and, as for 48, the 3rd interlayer film and

46 form [44] a reflector 5.
[0012] First, a reflective mold liquid crystal display component is explained, and it mentions later about the active component 30, the 1st light-shielding film 44, and the 2nd light-shielding film 46.
[0013] The liquid crystal display component of this example is a reflective mold, and incidence of the light irradiated by the liquid crystal display component 100 is carried out from the transparence substrate 2 side (drawing Nakagami side), and it penetrates the liquid crystal constituent 3, and it reflects with a reflector 5, and it penetrates the liquid crystal constituent 3 and the transparence substrate 2 again, and they carry out outgoing radiation from the liquid crystal display component 100. When a liquid crystal display component is used as a reflective mold and a reflector 5 is formed in the field by the side of the liquid crystal constituent 3 of the drive circuit board 1, it is possible to use an opaque silicon substrate etc. for the drive circuit board 1. Moreover, the active component 30 and wiring can be prepared in the bottom of a reflector 5, the reflector 5 used as a pixel is made large, and there is an advantage which can realize the so-called high numerical aperture. Moreover, there is also an advantage that heat can be radiated from the rear face of the drive circuit board 1 in the heat by the light irradiated by the liquid crystal display component 100.
[0014] Next, the actuation at the time of using electric-field control birefringence mode (ELECTRICALLY CONTROLLED BIRIEFRINGENCE MODE) for a liquid crystal display component is explained. The light which turned into the linearly polarized light by the polarizing element carries out incidence to the liquid crystal display component 100. If an electrical potential difference is impressed between a reflector 5 and a counterelectrode 6, liquid crystal molecular arrangement will change, consequently the rate of a birefringence in the liquid crystal display component 100 will change with the dielectric anisotropies of the liquid crystal constituent 3. Electric-field control birefringence mode uses change of this rate of a birefringence as change of light transmittance, and forms an image.
[0015] Furthermore, the single polarizing plate twist nematic mode (SPTN) which is one of the electric-field control birefringence modes is explained using drawing 2 . 9 divides the incident light L1 from the light source (not shown) into two polarization by the polarization beam splitter, and carries out outgoing radiation of the light L2 used as the linearly polarized light. Although drawing 2 shows the case where the light (P wave) which penetrated the polarization beam splitter 9 is used for the light which carries out incidence to the liquid crystal display component 100, it is also possible to use the light (S wave) reflected by the polarization beam splitter 9. A liquid crystal molecule major axis arranges the liquid crystal constituent 3 to abbreviation parallel to the drive circuit board 1 and the transparence substrate 2, and a dielectric anisotropy uses a forward nematic liquid crystal. Moreover, orientation of the liquid crystal molecule is carried out in the distorted condition with the orientation film 7 and 8.
[0016] The case where the electrical potential difference is not probably impressed to drawing 2 (a) is shown. The light which carried out incidence to the liquid crystal display component 100 turns into elliptically polarized light by the form birefringence of the liquid crystal constituent 3, and turns into the circular polarization of light in the 5th page of a reflector. The light reflected with the reflector 5 passes through the inside of the liquid crystal constituent 3 again, turns into elliptically polarized light again, and carries out outgoing radiation as a light L3 (S wave) which the polarization direction rotated 90 degrees to return and incident light L2 to the linearly polarized light at the time of outgoing radiation. Although incidence of the outgoing radiation light L3 is again carried out to a polarization beam splitter 9, it is reflected by plane of polarization and it turns into the outgoing radiation light L4. It displays by irradiating this outgoing radiation light L4 at a screen etc. In this case, when the electrical potential difference is not being impressed, light serves as means of displaying called the so-called Nor Marie White (NOMARI opening) who does outgoing radiation.
[0017] The case where receive and the electrical potential difference is impressed to drawing 2 (b) at the liquid crystal constituent 3 is shown. If an electrical potential difference is impressed to the liquid crystal constituent 3, in order that a liquid crystal molecule may arrange in the direction of electric field, a birefringence does not happen within liquid crystal. Therefore, it is reflected with a reflector 5 as it is, and outgoing radiation of the light L2 which carried out incidence to the liquid crystal display component 100 by the linearly polarized light is carried out as a light L5 of the same polarization direction as incident light L2. The outgoing radiation light L5 penetrates a polarization beam splitter 9, and returns to the light source. Therefore, since light is not irradiated by the screen etc., it becomes a black display.
[0018] In single polarizing plate twist nematic mode, since the direction of orientation of liquid crystal is parallel to a substrate, the general orientation approach can be used, and process stability is good. Moreover, since it is used by Nor Marie White, tolerance can be given to the poor display started by the low-battery side. That is, by the Nor Marie White method, dark level (black display) is obtained, where the high voltage is impressed. Since most liquid crystal molecules are assembled in the direction of electric field perpendicular to a substrate side in the case of this high voltage, it seldom depends for the display of dark level on the initial orientation condition at the time of a low battery. furthermore, human being's eye -- brightness nonuniformity -- as the relative ratio of brightness -- recognizing -- and brightness -- receiving -- a logarithm -- it has a reaction near a scale. Therefore, human being's eyes are sensitive to fluctuation of dark level. Such a reason to the Nor Marie White method is advantageous means of displaying to the brightness nonuniformity by the initial orientation condition.
[0019] The precision of a high cel gap is searched for in the electric-field control birefringence mode mentioned above. That is, in electric-field control birefringence mode, since the phase contrast between the abnormality light and Tsunemitsu who arise while light passes through the inside of liquid crystal is used, it depends for transmitted light reinforcement on retardation deltan-d between abnormality light and Tsunemitsu. Here, deltan is a refractive-index anisotropy and d is a cel gap between the transparence substrates 2 and the drive circuit boards 1 which are formed by the spacer 4.
[0020] Moreover, in a reflective mold, in order that it may reflect with a reflector and the light which carried out incidence to liquid crystal may pass liquid crystal again, when using the liquid crystal of the same refractive-index anisotropy deltan as a transparency mold, the cel gap d becomes half to a transparency mold. In the case of a general transparency mold liquid crystal display component, the cel gap d is about 2 micrometers in this example to being about 5-6 micrometers.

[0021] In this example, since it corresponded to a high cel gap precision and a cel gap narrower than before, the approach of forming a column-like spacer on the drive circuit board 1 instead of a certain bead variational method from the former was used.
[0022] The ** type top view explaining arrangement with the reflector 5 and spacer 4 which were formed on the drive circuit board 1 at drawing 3 is shown. Many spacers 4 are formed in the shape of a matrix all over the drive circuit board so that fixed spacing may be maintained. A reflector 5 is a pixel used as the smallest unit of the image which a liquid crystal display component forms. At drawing 3 , wide [which are shown with Signs 5A and 5B / 4 pixels long and 5 pixels wide] showed for simplification.
[0023] In drawing 3 , 4 pixels long and a 5 pixels wide pixel form the viewing area. The image displayed with a liquid crystal display component is formed in this viewing area. The dummy pixel 10 is formed in the outside of a viewing area. The circumference frame 11 is formed around this dummy pixel 10 with the same ingredient as a spacer 4. Furthermore, a sealant 12 is applied to the outside of the circumference frame 11. It is used for 13 supplying the signal from the outside to the liquid crystal display component 100 with an external connection terminal.
[0024] The resin ingredient was used for the ingredient of a spacer 4 and the circumference frame 11. After arranging the liquid crystal constituent 3 between the drive circuit board 1 and the transparence substrate 2 and assembling the liquid crystal display component 100, the liquid crystal constituent 3 is held in the field surrounded with the circumference frame 11. Moreover, a sealant 12 is applied to the outside of the circumference frame 11, and the liquid crystal constituent 3 is enclosed in the liquid crystal display component 100.
[0025] A sealant 12 has the duty which fixes the drive circuit board 1 and the transparence substrate 2, and the duty which prevents that the matter harmful to the liquid crystal constituent 3 advances. When the sealant 12 with a fluidity is applied, the circumference frame 11 serves as a stopper of a sealant 12. It is possible to be able to narrow design tolerance in the boundary of the liquid crystal constituent 3 or the boundary of a sealant 12, and to narrow the between from **** of the liquid crystal display component 100 to a viewing area by forming the circumference frame 11, as a stopper of a sealant 12, (******-izing).
[0026] The dummy pixel 10 is formed between the circumference frame 11 and the viewing area. The dummy pixel 10 is for making display quality of outermost pixel 5B and internal pixel 5A into homogeneity. That is, in order to avoid the poor display produced from structural discontinuity on the boundary of a viewing area and its boundary region, the so-called dummy pixel which does not contribute to a display with the same structure as a viewing area is prepared in a boundary region.
[0027] Moreover, the dummy pixel is conventionally prepared also for the purpose of the poor display prevention which is produced in the so-called dot reversal drive which is made to reverse a polarity and is driven by the ****** pixel. If drawing 4 is made into an example and internal pixel 5A is compared with outermost pixel 5B, since a ****** pixel exists in internal pixel 5A, in the case where it is a dot reversal drive, unnecessary electric field arise between ****** pixels. In the case where it receives and there is no dummy pixel 10 at outermost pixel 5B, since the falling unnecessary electric field have not produced display quality, display quality may come to compare with internal pixel 5B. If the difference of display quality arises in some pixels, it will serve as display nonuniformity. Therefore, in the case of a dot reversal drive, the dummy pixel 10 is formed, a signal is supplied like Pixels 5A and 5B, and display quality of outermost pixel 5B and internal pixel 5A is made equivalent.
[0028] In this example, since the dot reversal drive is not used, the display nonuniformity generated by the dot reversal drive method does not pose a problem. However, if an electrical potential difference is not impressed to the liquid crystal constituent 3 when using it by the normally white, the problem that the dummy pixel 10 is displayed white and spoils display quality will arise. Although shading the dummy pixel 10 is also considered, it is difficult to form a protection-from-light frame with a precision sufficient on the boundary of a viewing area. Then, an electrical potential difference which serves as a black display is supplied to the dummy pixel 10, and it was made to be observed as a black frame surrounding a viewing area. Moreover, the several pixels inside of 1 pixel of not only ****** but the circumference frame 11 is made into the dummy pixel 10.
[0029] Signs that dummy pixel 10D was formed in drawing 4 in the shape of a frame are shown. The signal with which dummy pixel 10D serves as a black display is supplied. Moreover, if dummy pixel 10D is formed with frame-like the electrode of one sheet as shown in drawing 4 , the black frame display of the viewing-area circumference can be realized comparatively easily. However, in dummy pixel 10D shown in drawing 4 , it turned out that a poor display occurs on the boundary of dummy pixel 10D and a viewing area.
[0030] If the electric field of the fixed direction are impressed to the liquid crystal constituent 3, since the liquid crystal constituent 3 will deteriorate conventionally, the drive approach which reverses the polarity of the electric field of the liquid crystal constituent 3 a fixed period, and the drive approach called the so-called alternating current drive are learned. In this example, an alternating current period is made into two frames, and the frame reversal which reverses the polarity of a signal by all pixels for every frame is used.
[0031] By the frame reversal method, the signal of like-pole nature is written in the all pixel in one frame. In drawing 4 , the signal writing to the effective pixel in a viewing area is performed in order downward from drawing Nakagami by the scan for every line. It receives and signal writing is performed at once for the electrode to which dummy pixel 10D was connected in common. Therefore, there are some which the period which the dummy pixel and the polarity have reversed in an effective pixel produces by the sequence written in, and the effective horizontal electric field of an effective pixel and a dummy pixel serve as an ununiformity by the location. It explains using the case where it considers as the whole surface black display which is this remarkable example below.
[0032] A black display (the case of a normally white high voltage) is written in the lower right one by one from the effective pixel upper left of drawing 4 , and this is completed by one frame. On the other hand, when the black display writing to dummy pixel 10D is performed by the same timing as the effective pixel upper left, and like-pole nature, between the pixel at the lower right of an effective pixel, and a dummy pixel, about one-frame period horizontal electric field occur. Moreover,

horizontal electric field generate only the period of a write-in timing difference with a dummy pixel also between other effective circumference pixels and a dummy pixel. The horizontal electric field built over liquid crystal by the normally white at the time of a black display float the part white. That is, when it considers as a full-screen black display, the white frame with which thickness differs will be displayed by the location between an effective pixel and a circumference dummy pixel.
[0033] Furthermore, the timing chart of the video signal in the case of using frame reversal for drawing 5 is shown, and the difference of write-in timing is explained. Expressing the video signal which it is written in pixel 5E of the 1st line shown in drawing 4 by the inside SE of drawing 5 , and is held, SF expresses the electrical potential difference on which the video signal of pixel 5F of the 4th line and SD are impressed to the signal for a black display of dummy pixel 10D, and Vcom is impressed to a counterelectrode 6. In drawing 5 , in order to make it intelligible, the case (whole surface black display) where the electrical potential difference which performs a black display is impressed to all pixels is shown.
[0034] Since the sequence that a video signal is written in is written in the lower right from the upper left in the example of drawing 4 , the pixel of the longitudinal direction of one line is written in one by one first. Then, the writing of the signal for a black display is performed in a lower line in order from drawing Nakagami's line. However, the signal for a black display written in a dummy pixel is written in to the same timing as pixel 5E of the 1st line. Moreover, the 1st frame is straight polarity to an electrical potential difference Vcom, and the 2nd frame is negative polarity.
[0035] In drawing 5 , the video signal written in pixel 5E of the 1st line is written in to the timing shown in an arrow head AE 1, and holds a video signal before the following arrow head AE 2. Since a video signal is written in downward from a top the whole line, the timing by which a video signal is written in the last pixel 5F of the 4th line serves as an arrow head AF 1. If the video signal SF written in pixel 5F is compared with the signal SD for a black display written in dummy pixel 10D, the video signal SF serves as a signal phase which was overdue during one abbreviation to the signal SD for a black display. Therefore, the one abbreviation period polarity is reversed and electric field (unnecessary electric field) produce a video signal SD and a video signal SF between pixel 5F and dummy pixel 10D. The orientation of the liquid crystal constituent 3 changes with these unnecessary electric fields, and the display nonuniformity as which a black display is displayed white a little occurs by the Nor Marie White method.
[0036] In addition, although explanation explained using pixel 5F of the 4th line, the signal with which the polarity also reversed the pixel of the 2nd line and the 3rd line to dummy pixel 10D is impressed. Therefore, although there is a difference of extent by the period which the polarity has reversed, display nonuniformity occurs similarly.
[0037] Although again returned and explained to drawing 3 , as shown in drawing 3 , in order to prevent the display nonuniformity of dummy pixel 10D, it considered as the configuration which prepares a dummy pixel for every line. To the same timing as the signal written in each line, the signal of a black display is written in the dummy pixel 10. That is, since the same polar signal as the pixel of the same line is written in the dummy pixel 10 prepared for every line, generating of unnecessary electric field can be prevented and display nonuniformity can be reduced.
[0038] the pixels 5A and 5B of others [configuration / of the dummy pixel 10 of drawing 3] furthermore -- comparing -- width -- it is considering as the long configuration. although a protection-from-light frame is prepared in it so that it may mention later in order not to apply a light unnecessary in addition to a display to the liquid crystal display component 100 -- the configuration of the dummy pixel 10 -- width -- it is possible to give allowances to the location precision at the time of installing a protection-from-light frame in the liquid crystal display component 100 by lengthening.
[0039] Next, using drawing 6 , an electrical potential difference is impressed to the 1st light-shielding film 44, a capacitor (capacitor) is formed between the 2nd light-shielding film 46, and it explains fluctuating the electrical potential difference of a reflector 5 to a counterelectrode 6 using this capacitor. Drawing 6 is what showed 1 pixel with the circuit diagram, and in order to make it intelligible, it shows the active component 30 as a switch. 52 is the scan signal line which supplies the signal which turns the active component 30 on and off, and 51 is a video-signal line which supplies the video signal written in a pixel. As shown in drawing 6 , the 1st capacitor 53 is formed with the reflector 5 and the counterelectrode 6. Moreover, the 2nd capacitor 54 is formed by the 1st light-shielding film 44 and 2nd light-shielding film 46. Here, for explanation, as what can disregard other parasitic capacitance, the capacity of the 1st capacitor 53 is CL and capacity of the 2nd capacitor 54 is set to CC.
[0040] As first shown in drawing 6 (a), an electrical potential difference V1 is impressed to the 1st light-shielding film 44 which is one electrode of the 2nd capacitor 54 from the exterior. Next, if the active component 30 is turned on with a scan signal, a video signal will be supplied to a reflector 5 and the 2nd light-shielding film 46. Here, the electrical potential difference supplied to a reflector 5 and the 2nd light-shielding film 46 is set to V2.
[0041] Next, as shown in drawing 6 (b), when the active component 30 is turned off, the electrical potential difference currently supplied to the 1st light-shielding film 44 is changed to V3 from V1. At this time, a reflector 5 and the electrical potential difference of the 2nd light-shielding film 46 become V2-(cc/CL+CC)x (V1-V3).
[0042] By changing the electrical potential difference of a reflector 5 by the approach mentioned above, the electrical potential difference impressed to a reflector 5 is made into straight polarity, and the signal of negative polarity can be made with the electrical potential difference impressed to the 1st light-shielding film 44. If the signal of negative polarity is made by such approach, the need of supplying the signal of negative polarity will be lost and it will become possible to form a circumference circuit with the component of low pressure-proofing.
[0043] Next, the 1st light-shielding film 44 and the 2nd light-shielding film 46 are explained using drawing 10 from drawing 7 . As shown in drawing 7 , in order that a reflector 5 may prevent a short circuit, it vacates fixed spacing and is prepared. Therefore, light carries out incidence from this clearance, incidence of the light which carried out incidence is carried out to a semi-conductor layer, and it forms an optical carrier. An optical carrier flows into a source field and the problem called the so-called photograph leak to which the video signal is changed generates it for a lot of charges by photo electric conversion.
[0044] When there is little quantity of light from the light source, since a reflector 5 has the role which shades, a great portion of light is reflected with a reflector 5, and the light which carries out incidence from a clearance does not pose a problem.

However, in the liquid crystal projector, in order to make brightness increase, a strong light is irradiated by the liquid crystal display component 100 from the light source. Therefore, only with a reflector 48, photograph leak cannot be prevented but a light-shielding film is prepared.
[0045] As shown in drawing 7 , when forming a color filter 6 in the transparence substrate 2, it is possible to form the black matrix 20 which is a light-shielding film between color filters. Since the black matrix 20 is formed so that a pixel may be surrounded, it will be exactly prepared in the location as for which light does not carry out incidence to the clearance between reflectors 48. Therefore, protection from light according to the black matrix 20 at the conventional liquid crystal display component was enough. When it is separated between the transparence substrate 2 and the drive circuit board 1 and the quantity of light increases, it becomes impossible however, to disregard the photograph leak by the light which carries out incidence aslant.
[0046] Moreover, in a liquid crystal projector, in order for there to be a method which performs separation of a color and composition outside a liquid crystal display component and not to use a color filter, it is not economical on a process to form the black matrix 20 in the transparence substrate 2 only for the purpose of protection from light. Furthermore, by the reflective method, when the black matrix 20 is used, there is also a problem that a numerical aperture falls.
[0047] Therefore, we decided to prepare a light-shielding film in the drive circuit board 1 at the same process as formation of other metal layers. The configuration which forms a light-shielding film 44 in drawing 8 at the drive circuit board 1 is shown. A semi-conductor layer can be adjoined, a light-shielding film 44 can be formed, and it is possible to protect from across the light which carries out incidence. Moreover, as for the light-shielding film 44, that of a pixel field is wearing ******, and opening formed in a light-shielding film 44 requires only opening of contact hole 42CH for taking a reflector 5 and electrical installation. Therefore, the light which carries out incidence to a semi-conductor layer becomes very little.
[0048] As mentioned above, high brightness-ization progresses, and the liquid crystal projector will have become by the liquid crystal projector, by the time use in the condition of having turned on lighting indoors is desired. Therefore, the quantity of light irradiated by the liquid crystal display component is also increasing from the light source. By the increment in the quantity of light, the artificer found out that a flicker on the screen by optical leak occurred also with the structure of drawing 8 . Although it could imagine that the amount of the light which carries out incidence to a semi-conductor layer decreased, and the problem by optical leak could be prevented when making small opening formed in the 1st light-shielding film 44, we decided to prepare the 2nd light-shielding film in opening of a reflector 5 as other approaches.
[0049] As shown in drawing 1 and drawing 9 , two light-shielding films, the 1st light-shielding film 44 and the 2nd light-shielding film 46, are provided. Drawing 9 R> 9 shows the configuration which carried out the laminating of the metal layer and the metal layer of the 2nd light-shielding film which are used for the 1st light-shielding film 44 to the connection of the 2nd light-shielding film 46 and the 1st electric conduction film 42.
[0050] Furthermore, the outline top view at the time of seeing a reflector 5 and the 2nd light-shielding film 46 from a liquid crystal layer side to drawing 10 is shown. In addition, the orientation film is omitted in order to make drawing intelligible. If it regards as a reflector 5 from a liquid crystal layer side in piles and the 2nd light-shielding film 46 is formed in the bottom as shown in drawing 10 , that light invades will become only opening shown by 49, and the amount of the light which carries out incidence by opening of a reflector 5 will decrease sharply. the 2nd light-shielding film 46 — a reflector 5 and abbreviation — since it forms in the same magnitude — the great portion of opening 5P of a reflector 5 — a wrap — things are possible.
[0051] Each reflector 5 is separated by opening 5P so that a reflector 5 may not be short-circuited, since an independent video signal is impressed the whole pixel. Since a video signal is similarly impressed to the 2nd light-shielding film 46, the 2nd light-shielding film 46 is also separated by opening 46P.
[0052] That is, light will invade from opening 5P prepared so that it might not connect too hastily, and opening 46P. Then, it has closed so that light may not carry out direct incidence of opening 5P of a reflector 5 by the 2nd light-shielding film 46. Furthermore, opening 46P of the 2nd light-shielding film 46 are closed so that a reflector 5 may prevent the incidence of light. Thus, the effectiveness of protection from light is increasing by having plugged up each opening with the form compensated mutually.
[0053] However, the 2nd light-shielding film 46 does not contact directly, and opening 5P are not necessarily closed. Between the 2nd light-shielding film 46 and a reflector 5, in order to prevent connecting too hastily, the interlayer film is formed, and light will be transmitted in the inside of an interlayer film. Then, the 1st light-shielding film 44 is formed so that the light which carries out incidence to a semi-conductor layer may be prevented further. Although invasion of light is the amount restricted from opening 49, it is that the 1st light-shielding film 44 is formed further, and invasion of the light to a semi-conductor layer is prevented more certainly. It prepares in the 1st light-shielding film 44, and **** opening is only contact hole 44CH for every pixel. That is, the 1st light-shielding film 44 will close further the opening 49 of optical leakage uncancelable even if it forms the 2nd light-shielding film 46.
[0054] As shown in drawing 11 , it is also possible to plug up the opening 49 of optical leakage with an insulating material directly. For example, it is possible to form a light-shielding film 22 with the same resin ingredient as a spacer 4 on the opening 49 of optical leakage. In drawing 11 , the spacer 4 is formed on opening 49. It is also possible to close opening 5P of a reflector 5 with the resin light-shielding film 22 furthermore.
[0055] Moreover, as mentioned above, a capacitor (capacitor) can be formed between the 1st light-shielding film 44 and the 2nd light-shielding film 46. Since the video signal written in a reflector 5 is impressed to the 2nd light-shielding film 46, if a fixed electrical potential difference is impressed to the 1st light-shielding film 44, it can also be used as retention volume. Moreover, since the video signal is impressed to the 2nd light-shielding film 46, the 2nd light-shielding film 46 works also as the 2nd reflector. As shown in drawing 10 , it is possible to have exposed the opening 5P to 2nd light-shielding film 46 between a reflector 5 and a reflector 5, and to impress an electrical potential difference to a liquid crystal constituent through the 4th interlayer film 47, orientation film (not shown), etc. Since the alternating current drive of the 2nd light-shielding film 46 is carried out like a reflector 5, the electrical potential difference which the polarity reversed the fixed period can be

impressed also to an about [opening 5P] liquid crystal constituent by the 2nd light-shielding film 46, and it prevents that the electric field (dc component) of the fixed direction are impressed to the about [opening 5P] liquid crystal presentation section.
[0056] Next, the dummy pattern formed in order to equalize the pattern consistency in a chip is explained using drawing 12 . The dummy pattern formed around the external connection terminal 13 at drawing 12 (a) and drawing 12 (b) is shown. In the drive circuit board 1, in order to prevent the short-circuit at the time of terminal strapping between the external connection terminal 13 and the external connection terminal 13, it does not prepare the configuration of those other than external connection terminal 13. therefore, other fields in the drive circuit board 1 -- comparing -- a pattern consistency -- rough -- it is that it is ****. By preparing a dummy pattern around the external connection terminal 13, the pattern consistency became homogeneity and polish of the thin uniform film was attained.
[0057] Next, the sectional view of the external connection terminal 13 circumference is shown in drawing 12 (b). The external connection terminal 13 accumulates and forms the 1st electric conduction film 42, 1st light-shielding film 44, 2nd light-shielding film 46, and reflector 5. In order to thicken thickness of the electric conduction film of a connection, the 1st light-shielding film 44, 2nd light-shielding film 46, and reflector 5 are made into three layers in piles. The signal line wired in a drive circuit is formed by the 1st electric conduction film 42, and are collected, a contact hole is vacated for an interlayer film and the 1st light-shielding film 44 and the 1st electric conduction film 44 are connected to it.
[0058] Drawing which laid the transparence substrate 2 on top of drawing 13 at the drive circuit board 1 is shown. It is maintenance **** to the inside where the circumference frame 11 is formed in the periphery of the drive circuit board 1, and the liquid crystal constituent 3 was surrounded by the circumference frame 11, the drive circuit board 1, and the transparence substrate 2. A sealant 12 is applied to the outside of the circumference frame 11 between piled-up drive circuit boards 1 and transparence substrates 2. Adhesion immobilization of the drive circuit board 1 and the transparence substrate 2 is carried out by the sealant 12, and the liquid crystal display component (liquid crystal panel) 100 is formed.
[0059] Next, as shown in drawing 14 , the flexible printed wiring board 80 which supplies the signal from the outside to the liquid crystal display component 100 is connected to the external connection terminal 13.
[0060] It connects with the counterelectrode 5 which was formed for a long time as compared with other terminals, and was formed in the transparence substrate 2, and the terminal of both the outsides of a flexible printed wiring board 80 forms the terminal 81 for counterelectrodes. That is, the flexible printed wiring board 80 is connected to both the drive circuit board 1 and the transparence substrate 2.
[0061] Wiring to the conventional counterelectrode 5 was what a flexible printed wiring board is connected to the external connection terminal prepared in the drive circuit board 1, and is connected to a counterelectrode 5 via the drive circuit board 1. The connection 82 with a flexible printed wiring board 80 is formed in the transparence substrate 2 of this example, and direct continuation of a flexible printed wiring board 80 and the counterelectrode 5 is carried out. That is, a liquid crystal panel 100 comes out of some transparence substrates 2 outside the drive circuit board 1, although the transparence substrate 2 and the drive circuit board 1 are put [they pile them up and] together and formed, the connection 82 is formed, and it connects with the flexible printed wiring board 80 in the part which came out to the outside of this transparence substrate 2.
[0062] The configuration of a liquid crystal display 200 is shown in drawing 15 , drawing 16 , and drawing 17 . Drawing 15 is the decomposition assembly Fig. of each structure which constitutes a liquid crystal display 200. Moreover, drawing 16 is the top view of a liquid crystal display 200, and drawing 17 is the sectional view of drawing 16 . In addition, in drawing 17 , in order to make it intelligible, each configuration is indicated more thickly than a dressed size.
[0063] As shown in drawing 15 , the liquid crystal panel 100 to which the flexible printed wiring board 80 was connected sandwiches a cushioning material 61 in between, and is arranged at a heat sink 62. A cushioning material 61 is high temperature conductivity, fills the clearance between a heat sink 62 and a liquid crystal panel 100, and has the duty in which the heat of a liquid crystal panel 100 carries out propagation ****** at a heat sink 62. 63 is mold and adhesion immobilization is carried out at the heat sink 62.
[0064] Moreover, as shown in drawing 17 , the flexible printed wiring board 80 is taken [between / mold 63 and heat sinks 62] out by the outside of mold 63 in the passage. It has prevented 65 being equivalent to other members from which it is a gobo and the light from the light source constitutes a liquid crystal display 200. 66 expresses the outer frame of the viewing area of a liquid crystal display 200 as a protection-from-light frame.
[0065]
[Effect of the Invention] As explained above, the reflective mold liquid crystal display used for the liquid crystal projector expected miniaturization, highly-minute-izing, and high brightness-ization is realizable by considering as the configuration of this invention. Moreover, a high-definition reflective mold liquid crystal display is realizable. Moreover, the incidence of an unnecessary light generated for a liquid crystal display component is prevented, and it is possible to realize the liquid crystal display of high-definition image quality and the liquid crystal projector using it.

[Translation done.]

DESCRIPTION OF DRAWINGS

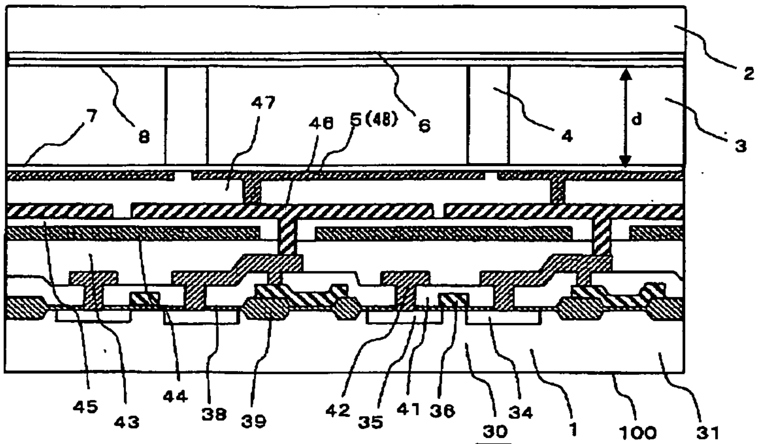
[Brief Description of the Drawings]
[Drawing 1] It is the type section Fig. of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 2] It is the mimetic diagram explaining the gestalt of 1 operation of the liquid crystal display by this invention of a liquid crystal display component.
[Drawing 3] It is the ** type top view of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 4] It is the ** type top view of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 5] It is drawing explaining actuation of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 6] It is a ** type circuit diagram explaining actuation of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 7] It is the type section Fig. of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 8] It is the type section Fig. of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 9] It is the type section Fig. of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 10] It is the ** type top view of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 11] It is the ** type top view of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 12] It is drawing explaining the connection terminal area explaining the gestalt of 1 operation of the liquid crystal display by this invention of a liquid crystal display component.
[Drawing 13] It is drawing explaining the assembly of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 14] It is the ** type top view of the liquid crystal display component explaining the gestalt of 1 operation of the liquid crystal display by this invention.
[Drawing 15] It is the ** type assembly Fig. of the liquid crystal display by this invention.
[Drawing 16] It is the ** type top view of the liquid crystal display by this invention.
[Drawing 17] It is the type section Fig. of the liquid crystal display by this invention.
[Description of Notations]
1 [-- Spacer,] -- The drive circuit board, 2 -- A transparence substrate, 3 -- A liquid crystal constituent, 4 5 [-- Polarization beam splitter,] -- A reflector, 6 -- 7 A counterelectrode, 8 -- The orientation film, 9 10 [-- External connection terminal,] -- A dummy pixel, 11 -- A circumference frame, 12 -- A sealant, 13 30 [-- Channel stopper,] -- An active component, 31 -- A silicon substrate, 32 -- It is a well and 33 n molds. 34 [-- Insulator layer,] -- A source field, 35 -- A drain field, 36 -- A gate electrode, 38 39 -- Field oxide, 41 -- The 1st interlayer film, 42 -- 1st electric conduction film, 43 [-- The 2nd light-shielding film,] -- The 2nd interlayer film, 44 -- The 1st light-shielding film, 45 -- The 3rd interlayer film, 46 47 [-- Scan signal line,] -- The 4th interlayer film, 48 -- The 2nd electric conduction film, 49 -- Opening, 51 52 [-- Mold, 64 / -- The binder for protection 65 / -- A gobo, 66 / -- A protection-from-light frame, 80 / -- A flexible patchboard, 81 / -- The terminal for counterelectrodes 82 / -- A flexible patchboard connection 100 / -- A liquid crystal display component, 200 / -- Liquid crystal display.] -- A video-signal line, 61 -- A cushioning material, 62 -- A heat sink, 63

[Translation done.]

DRAWINGS

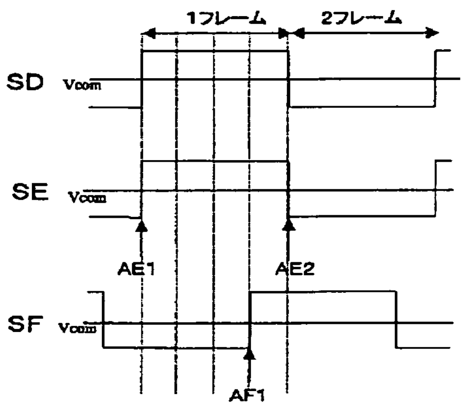
[Drawing 1]

図1



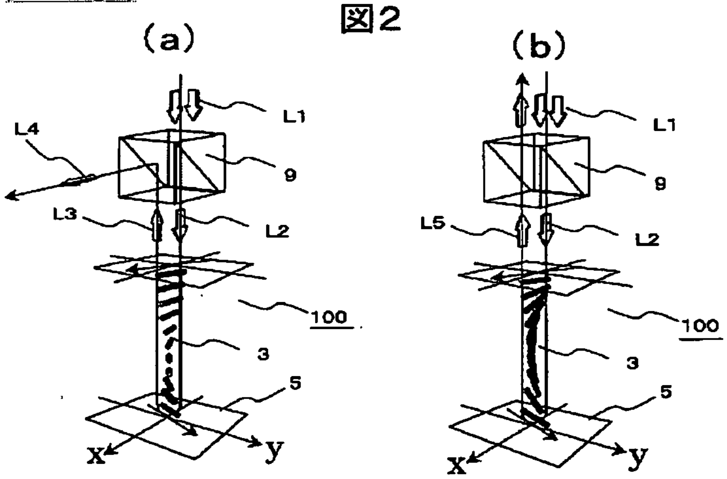
[Drawing 5]

図5



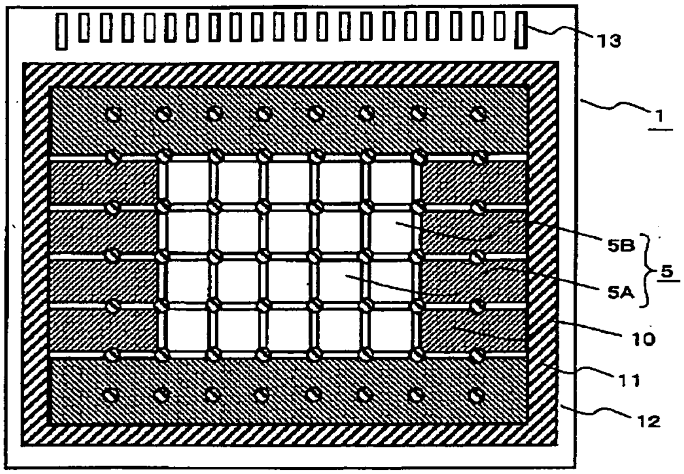
[Drawing 2]

図2



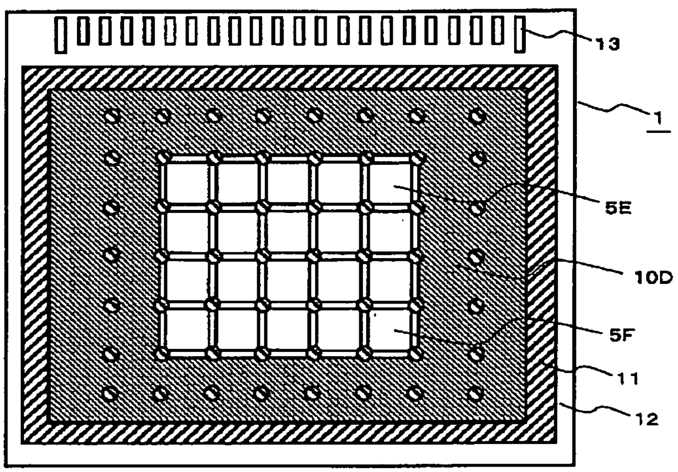
[Drawing 3]

図3



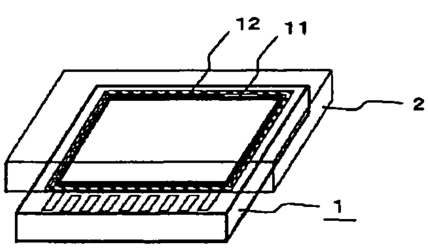
[Drawing 4]

図4



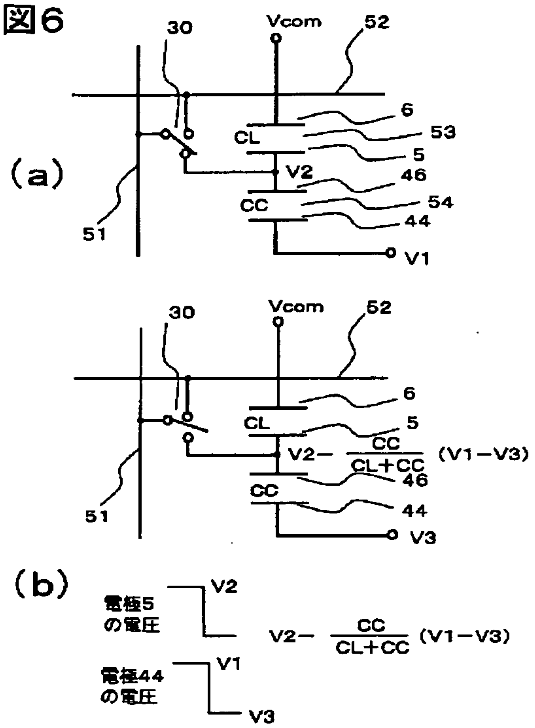
[Drawing 13]

図13



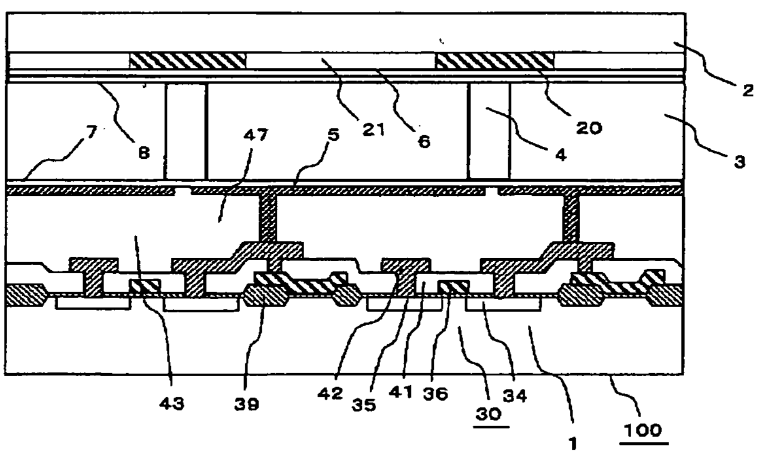
[Drawing 6]

図6



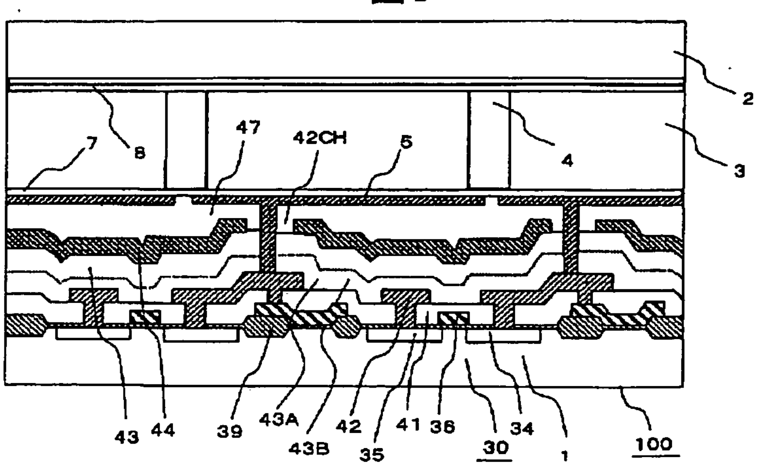
[Drawing 7]

図7



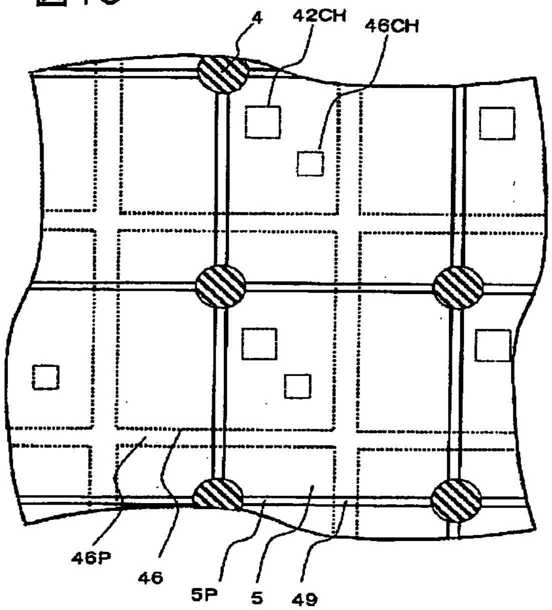
[Drawing 8]

図8



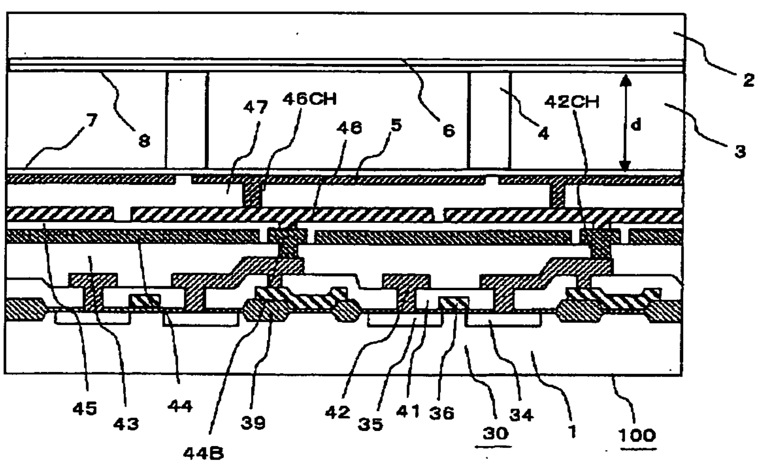
[Drawing 10]

図10



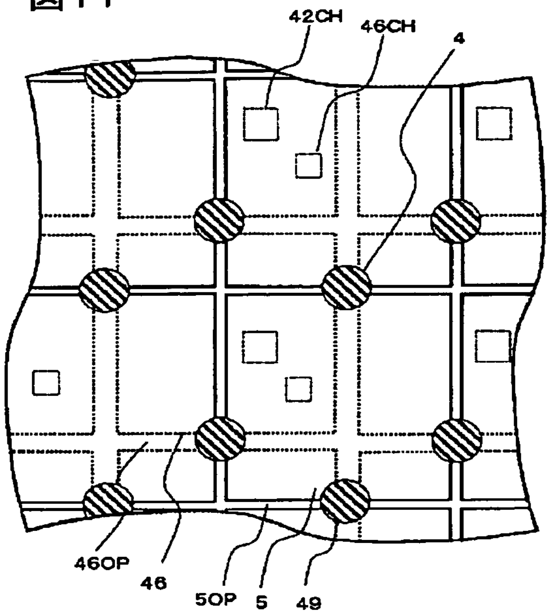
[Drawing 9]

図9



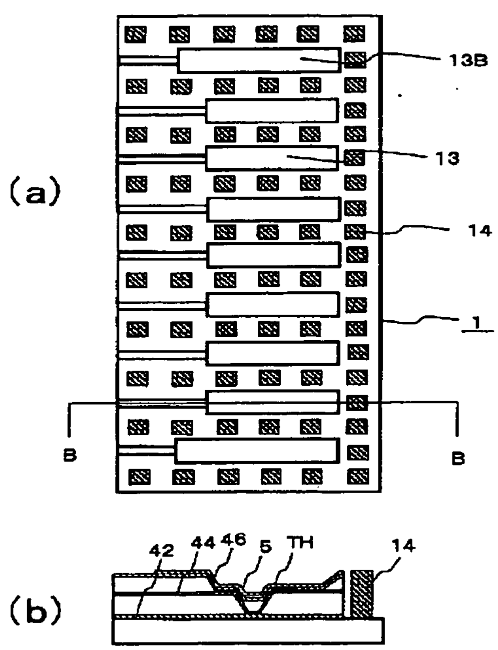
[Drawing 11]

図11



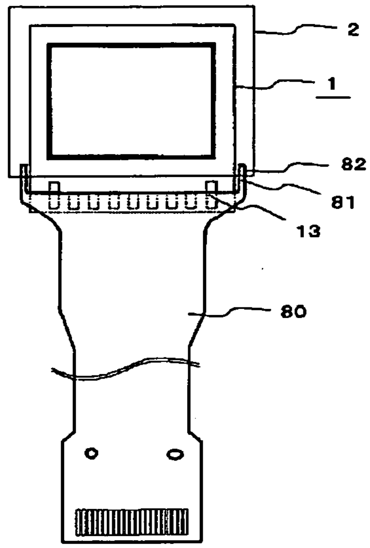
[Drawing 12]

図12



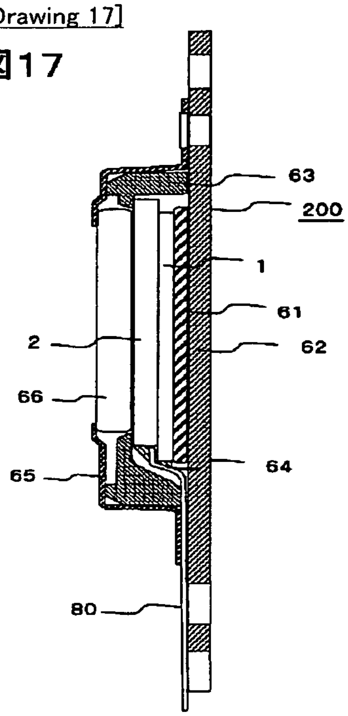
[Drawing 14]

図14



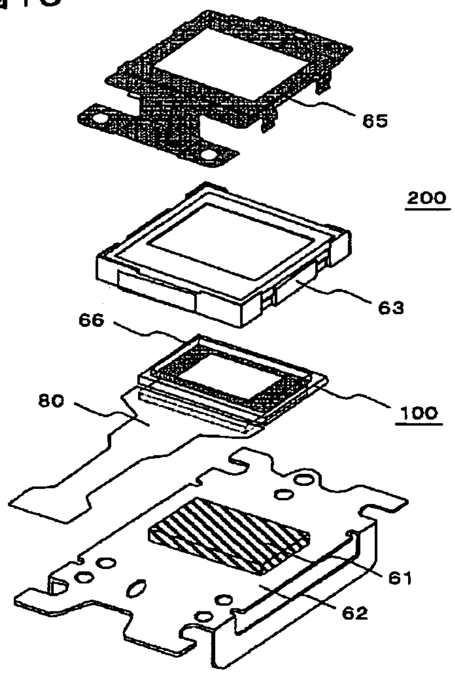
[Drawing 17]

図17



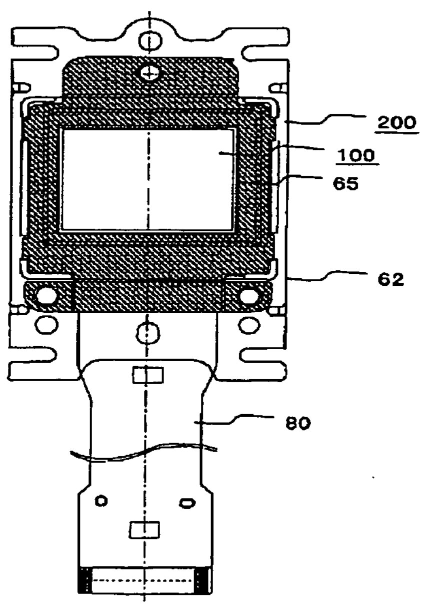
[Drawing 15]

図15



[Drawing 16]

図16



[Translation done.]